PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Outokumpu Oyj
Intellectual Property Management
P.O. Box 27
FIN-02201 Espoo
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PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	09-02-2005
Applicant's or agent's file reference: 20021990 WO	IMPORTANT NOTIFICATION

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI2003/000826	06-11-2003	07-11-2002

Applicant
Outokumpu Oyj
et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in som Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the *PCT Applicant's Guide*.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, intentive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed invention is patentable or not" (see Also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the IPEA/ Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Christina Wall Telephone No. 08-782 25 00
Telex 17978 PATOREG-S	

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 20021990 WO	**FOR FURTHER ACTION** See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000826	International filing date *(day/month/year)* 06.11.2003	Priority date *(day/month/year)* 07.11.2002
International Patent Classification (IPC) or national classification and IPC C25C 7/02, C25C 1/16, C25B 9/02		
Applicant Outokumpu Oyj et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
19.05.2004	26.01.2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Ulrika Nilsson/ELY Telephone No. +46 8 782 25 00

Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI 2003/000826

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-7 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 9-11 received by this Authority on 22-10-2004
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI 2003/000826

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-16	YES
	Claims		NO
Inventive step (IS)	Claims	1-16	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

This statement is based on the claims 1-16 filed with the letter of October 22, 2004.

Documents cited in the International Search Report:

D1: US 4 015 099 A (WILLIAM SENIUK ET AL)
D2: US 2 790 656 A (L.A. COOK)
D3: US 4 035 280 A (RICHARD DEANE ET AL)
D4: EP 0 376 447 A1 (ZIMCO INDUSTRIES (PROPRIETARY) LIMITED
D5: DE 3 323 516 A1 (HAPAG-LLOYD WERFT GMBH)
D6: GB 2 252 569 A (BICC PUBLIC LIMITED COMPANY)

D1 discloses a process for fixing a Cu contact button to the Al or Al alloy conductor bar of an electrode plate. The process comprises (a) coating the Cu button with a thin layer of Ag; (b) mechanically screwing the Cu button in the conductor bar; (c) pre-heating the assembly; (d) welding the Ag-coated Cu button to the Al bar. The solid mechanical joint obtained by screwing is thus being reinforced by a strong metallurgical bond with a low electrical contact resistance.

D2-D6 represent less relevant prior art.

The documents do not disclose the special combination of features defined in the invention and D1 is therefore now reconsidered to only represent prior art. According to the

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

invention, a transmission layer is formed on the area on the lower surface of the support bar contact piece, the contact surface. After that the contact surface is coated with a silver or silver alloy having a thickness of 0.5-2 mm and the transmission layer and the coating form a metallurgical joint with the copper contact piece.

It is not considered obvious to a person skilled in the art to modify the known method or bar in D1 so as to obtain a method or support bar such as the ones claimed in the invention.

Therefore, the invention according to claims 1-16 is novel, considered to involve an inventive step and has industrial applicability.

PATENT CLAIMS

1. A method for the formation of a good contact surface on a support bar of an aluminium cathode used in electrolysis, onto the end of which bar a copper contact piece is attached, wherein the cathode plate is immersed in an electrolysis cell and the support bar is supported by its ends on the sides of the electrolysis cell so that the contact piece is located on top of a busbar, **characterised in that** a transmission layer is formed on the area on the lower surface of the support bar contact piece, the contact surface, which is to touch the electrolysis cell busbar and after that the contact surface is coated with a silver or silver alloy having a thickness of 0,5 – 2 mm and the transmission layer and the coating form a metallurgical joint with the copper contact piece.

2. A method according to claim 1, **characterised in that** the transmission layer is tin or a tin-dominant layer.

3. A method according to claim 1 or 2, **characterised in that** the silver or silver alloy layer is formed using soldering technique.

4. A method according to claim 1 or 2, **characterised in that** the silver or silver alloy layer is formed using thermal spraying technique.

5. A method according to claim 4, **characterised in that** the thermal spraying technique is based on gas combustion.

6. A method according to claim 4 or 5, **characterised in that** the thermal spraying technique is high velocity oxy-fuel spraying.

7. A method according to claims 1 - 2 or 4 - 6, **characterised in that** silver or silver alloy is in powder form.

AMENDED SHEET

8. A method according to claim 4 or 5, **characterised in that** the thermal spraying technique is flame spraying.

9. A method according to any of claims 1 – 2, 4 - 5 or 8, **characterised in that** silver or silver alloy is in wire form.

10. A method according to any of the above claims, **characterised in that** the contact surface is subjected to heat treatment after coating.

11. A method for the repair of contact surface of an aluminium cathode support bar used in electrolysis, wherein a copper contact piece is attached to one end of the support bar, in electrolysis the cathode plate is immersed into an electrolysis cell and the contact piece of the support bar is supported on the electrolysis cell busbar, **characterised in that** the lower surface acting as the contact surface of the support bar contact piece is first straightened out linearly and a transmission layer of tin is formed on the lower surface after that the contact surface is coated with silver or silver alloy having a thickness of 0,5 – 2 mm, so that the copper, tin and silver or silver alloy coating form a metallurgical joint.

12. A method for the repair of contact surface of an aluminium cathode support bar used in electrolysis, wherein a copper contact piece is attached to one end of the support bar and the lower edge of the contact piece is furnished with a notch, in electrolysis the cathode plate is immersed into an electrolysis cell and the support bar is supported on the electrolysis cell busbar at the notch, **characterised in that** the inclined sides of the notch act as the contact surface of the support bar contact piece, and are first straightened out linearly and then a transmission layer of tin is formed on the sides and after that the contact surface is coated with silver or silver alloy having a

thickness of 0,5 – 2 mm so that the copper, tin and silver or silver alloy coating form a metallurgical joint.

13. A support bar for an aluminium cathode used in electrolysis, where a cathode plate of the cathode is meant to be immersed in an electrolysis cell and the cathode support bar to be supported at its ends on the edge of the electrolysis cell, so that a contact piece of copper is attached to one end of the support bar, **characterised in that** the area of the lower surface of the support bar contact piece, the contact surface touching the busbar, has been coated with silver or silver alloy having a thickness of 0,5 – 2 mm and before coating, a transmission layer has been formed on the contact surface, the silver or silver alloy coating forming a metallurgical joint with the transmission layer and the copper of the contact piece.

14. A support bar according to claim 13, **characterised in that** the transmission layer is tin or a tin-dominant alloy.

15. A support bar according to claim 13 or 14, **characterised in that** the silver or silver alloy layer is formed using soldering technique.

16. A support bar according to claim 13 or 14, **characterised in that** the silver or silver alloy layer is formed using thermal spraying technique.